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(54) A beta-glucane enriched alimentary fiber and process for preparing the same.

(57) The invention relates to a process for the preparation of a cellulose-containing, beta-glucane enriched grain, preferably oats or barley, fiber for use as food or as a raw material or additive in the food industry. In the process, a ground or unground grain, preferably oats or barley, is slurried rapidly in cold water, which may contain an organic solvent. The slurry is homogenized rapidly and is screened, whereby a beta-glucane containing fiber is obtained.

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A BETA-GLUCANE ENRICHED ALIMENTARY FIBER AND PROCESS FOR PREPARING THE SAME

The field of the invention

The present invention is related to a process for preparing a beta-glucane enriched, cellulose-containing alimentary fiber intended for use as raw material or additive in the food industry and as food.

The Background of the Invention

In known processes, beta-glucane enriched fiber is prepared by grinding the grain while dry and an by screening the fiber material from the starch component. The fiber material thus obtained typically contains beta-glucane at maximum 15 % and a considerable amount of starch. Wet grinding processes have not been used previously, except for wheat, which contains only minor amounts of beta-glucane (US Patent 3 788 861), because, when the grain material becomes wet, enzymes which dissolve beta-glucane are activated and destroy the beta-glucane.

Fiber preparations devoid of beta-glucane are prepared by wet methods. Many processes are known per se for the isolation of beta-glucane. They are characterised by dissolving the beta-glucane, for example, in alkaline conditions and its reprecipitation, for example, with alcohol or acetone. The greatest problem involved in these processes is the high viscosity of the beta-glucane solution even at very low concentrations of beta-glucane. The precipitation respectively requires a large amount of solvent, which has to be recovered and reconcentrated. This makes these processes uneconomical.

The Objectives of the Invention.

It is an objective of the present invention to eliminate the disadvantages described above.

A further objective of the invention is a beta-glucane containing alimentary fiber prepared according to the process.

It is a specific objective of the invention to provide a process in which a fiber fraction which contains especially much beta-glucane and especially little starch can be pepared from grain, preferably from oats or barley, a fraction which, owing to its healthful effects, its production-promoting properties in food products and its pleasantly mild taste is suitable for use as food and as a raw material or additive in the food industry.

It is further an object of the invention to provide a new type of fiber preparation, which contains a large amount of beta-glucane and little starch.

Summary of the Invention

The invention is related to a process for the preparation of a cellulose-containing, beta-glucane enriched grain, preferably oats or barley, fiber intended for use as food and as a raw material in the food industry. In the process ground or unground grain is slurried rapidly in cold water, which may contain an organic solvent. The slurry is homogenized rapidly and screened. A beta-glucane containing fiber is obtained from the screening.

The temperature of the slurrying water is 0-15 °C, preferably 8 °C. The slurrying water may contain an organic solvent, such as ethanol, 5-94 % by weight. Furthermore, the process is characterized in that the slurry is homogenized using a wet grinder and that the fiber is separated by screening.

The screening is preferably proceeded in two stages ; in the first the mesh size is approximately 2000µm, preferably 800 µm and in the second it is approxilately 40 mm.

The invention is also related to the beta-glucane enriched grain, preferably oats or barley, fiber prepared by any of the processes described above and intended for use as food or as a raw material or additive in the food industry. The beta-glucane concentration of the fiber according to the present invention is 15-40 %, but preferably 15-30 % and starch concentration 5-30 %.

The Detailed Description of the Invention

Grain, preferably oats or barley, crops contain, especially in the seed, a large amount of beta-glucane combined with a cellulose-containing fiber material.

The invention is based on the basic idea that ground or unground grain, preferably oats or barley, is slurried rapidly in cold water, is homogenized rapidly, and the fiber material is separated by screening. The obtained fiber material is dried rapidly by using known drying techniques. The yield can be improved even from this by using for the slurrying, for example, ethanol-containing cold water, since organic solvents have a beta-glucane

precipitating effect. The use of organic solvents also enables oils and fats to be isolated from grain. The endosperm component separating in the screening may be used, for example, for the preparation of starch, ethanol and protein.

This fiber preparation is characterized by a beta-glucane content of up to more than 30 %, a very low starch content, and a thickening effect based on the beta-glucane. In foods, this preparation increases the fiber contact, decreases the energy content, and the beta-glucane present in it lowers the blood cholesterol level.

According to the invention, ground or unground grain, preferably oats or barley, is slurried rapidly in cold water having a temperature of 0-15 °C, preferably +8 °C. The dry substance content at the slurrying stage is 10-45 %, preferably 30 %. The slurry is homogenized in an effective wet grinder with as little delay as possible. The homogenized slurry is screened in two stages, the coarser hull and other such material being separated in the first stage and the actual beta-glucane fiber in the second stage. The endosperm component passes both stages. The obtained damp beta-glucane fiber is dried by some known drying method, but as rapidly as possibly.

If an organic, water-soluble solvent, preferably ethanol, at a concentration of 5-94 % suitably 10-50 %, preferably 20 %, is used for the slurrying in addition to cold water, the yield of beta-glucane in the fiber fraction rises as high as 96 %. In this case the oils and fats of the grain dissolve in the organic solvent, and they can be separated in a very pure form by removing the organic solvent by evaporation.

The invention is described below in detail with the help of some ewamples, the purpose of which is to further illustrate the invention.

Example 1.

The initial material used was ground barley from which the outer covering of the seed (hull) had been screened off. The flour was slurried in +10 °C water to form an approximately 30 % slurry (dry substance content). The slurry was homogenized in a continuous-working wet grinder and screened in a two-stage rotating conical sieve ; the mesh size was 800 µm in the first screening stage and 80 µm in the second stage. Cold washing water was directed onto the screen surface of the second stage in order to enhance the separation of the endosperm component. In the obtained fine fiber fraction, the beta-glucane concentration was 18 % and the starch concentration 25 %. The beta-glucane yield, calculated from the beta-glucane of the initial materials, was approximately 75 %.

Example 2.

The initial material used was dehulled oats. The groats were mixed with cold water and were fed directly to homogenization. The temperature of the water was + 8 °C, the dry matter content in the slurrying was 20 %. The homogenized slurry was screened in a two-stage sieve, as in Example 1. In the obtained fiber fraction the beta-glucane concentration was 31 % and the starch concentration 10 %. The beta-glucane yield, calculated from the beta-glucane of the initial material, was approximately 90 %.

Example 3.

The initial material used was ground, dehulled oats. The groats were slurried in an ethanol solution to 16 % by weight having a temperature of 12 °C. The slurry was homogenized and screened as in Examples 1 and 2.

The beta-glucane concentration of the fiber fraction was 28 % and its starch concentration 12 %. The beta-glucane yield was approximately 85 %. In adddition, the starch and protein were separated by centrifugation from the endosperm slurry which has passed the screening. Ethanol was evaporated out from the supernatant, whereupon the oil of the oats separated in unoxidized state to the surface.

Claims

1. A process for the preparation of a cellulose-containing, beta-glucane enriched grain, preferably oats or barley, fiber intended for use as food and as a raw material or additive in the food industry, characterized in that ground or unground grain, preferably oats or barley, is slurried rapidly in cold water, which may contain an organic solvent and wherein the slurry is homogenized rapidly and screened to obtain a beta-glucane containing fiber from the screening.

2. The process according to Claim 1, characterized in that the temperature of the slurrying water is 0-15 °C, preferably 8 °C.

3. The method according to Claim 1 or 2, characterized in that the slurrying water may contain an organic solvent, such as ethanol, 5-94 % by weight, preferably 20 % by weight.

4. The process according to any of Claims 1-3,

characterized in that the slurry is homogenized using a wet grinder.

5. The process according to any of Claims 1-4, characterized in that the fiber is separated by screening.

6. The process according to Claim 5, characterized in that the screening is in two stages ; in the first the mesh size is approximately 2000 µm, preferably 800 µm, and in the second it is approximately 40 µm, preferably 80 µm.

7. A beta-glucane enriched grain, preferably oats or barley, fiber for use as food or as a raw material or additive in the food industry, characterized in that it is prepared by any of the processes according to Claims 1-6, and that its beta-glucane concentration is 15-40 % and starch concentration 5-30 %.